**Neutral Citation Number: [2025] UKUT 053 (LC)**

**Case No: LC-2024-52**

**IN THE UPPER TRIBUNAL (LANDS CHAMBER)**
**IN THE MATTER OF A NOTICE OF REFERENCE**

**14 February 2025**

**TRIBUNALS, COURTS AND ENFORCEMENT ACT 2007**

***COMPENSATION – TREE PRESERVATION ORDER – cracks to rear of property – refusal of consent to fell an oak tree in adjoining land – claim for costs of underpinning works – causation – claim dismissed - Town and Country Planning (Tree Preservation) (England) Regulations 2012***

**BETWEEN:**

**CHUBB EUROPEAN GROUP SE**

**Claimant**

**-and-**

**ENFIELD LONDON BOROUGH COUNCIL**

**Compensating Authority**

**98 Old Park Ridings,**
**Enfield,**
**London, N21 2EP**

**Mrs Diane Martin, TD, MRICS FAAV**
**6-7 November 2024**

*Mr Robin Green*, instructed by Kennedys for the claimant
*Mr James Neill*, instructed by Legal Services, London Borough of Enfield

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No cases are referred to in this decision.

## Introduction

1. This is a claim for compensation under regulation 24 of the Town and Country Planning (Tree Preservation) (England) Regulations 2012 ("the Regulations") for losses alleged to have been attributable to the refusal of consent to fell a protected tree. The claimant was the insurer of 98 Old Park Ridings, London N21 2EP ("the property") when cracking was first noticed to the property in January 2014. The local planning authority, responsible for compensation under the Regulations, is Enfield London Borough Council ("the authority").

2. The claim is for the cost of underpinning works carried out in late 2018 and early 2019 to the rear extension of the property and its garage, following the authority's third refusal of consent to fell an oak tree, dated 2 February 2018. The claimant's assessment of the cost of relevant works, including VAT and professional fees, was £143,480.75. The authority's assessment was £99,212.98, without prejudice to their position that the cause of damage had not been established and also that the remedial works carried out were not appropriate.

3. The claimant was represented by Mr Robin Green, who called Mr Daniel Kennedy, to give evidence of fact for the claimant, Dr Martin Dobson BSc(Hons), D Phil, FArborA, MEWI to give expert arboriculture evidence and Mr Stuart Allen BSc, CEng, FIStructE, MICE to give expert engineering evidence.

4. The authority was represented by Mr James Neill, who called Mr Simon Pryce BSc, FArborA, RCArborA, CBiol, FICFor to give expert arboriculture evidence and Mr Tim Freeman MA(Cantab) to give expert engineering evidence. Written evidence of fact was provided by Ms Sharon Davidson, Planning Decisions Manager for the authority, who was not called for cross-examination.

5. It was agreed by the parties that I would not make a site inspection since the property had been sold after being repaired and the factors affecting the claim were well evidenced by photographs and reports from the period before repair.

## Factual background and chronology

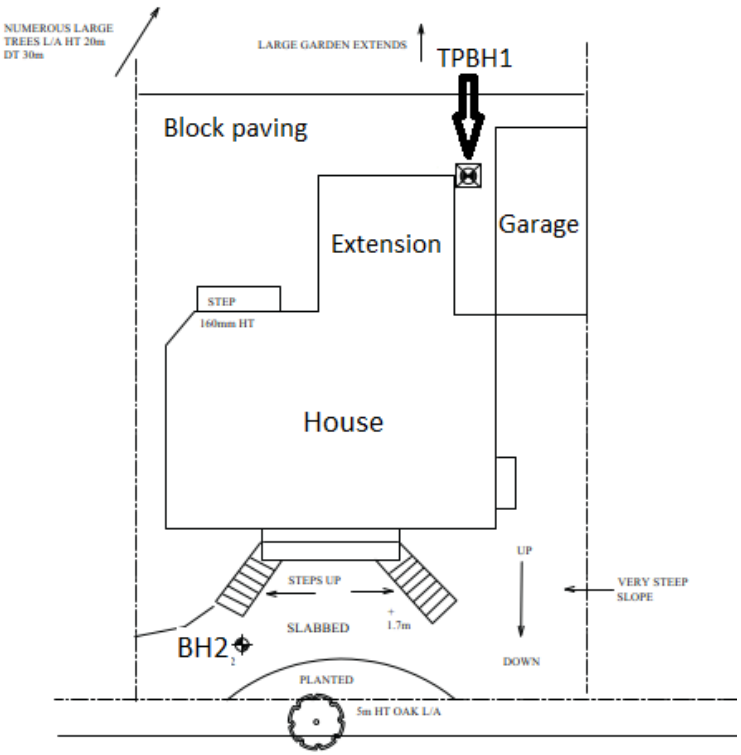
6. The property is a detached, traditionally constructed two-storey house, with attic rooms under a hipped roof, built in the early part of the 20th century. It has a two-storey extension to the rear right hand side (looking from the front) and a single storey garage/workshop abutting the rear righthand corner of the house. The rear garden of the property backs on to grounds belonging to Bush Hill Park Golf Club ("the Golf Club") in which is a row of trees protected by a Tree Preservation Order confirmed on 20 May 1958 ("the TPO"). The row includes, close to the boundary of the property, two oak trees which have been referred to as T1 and T2. T1, the subject of these proceedings, is agreed to be 28m high. It is 29.15m from the garage and 31.65m from the extension. T2 is also 28m high. It is 33.1m from the garage and 35.4m from the extension. There are two cypress trees in the rear garden, one 8.0m high on the right hand boundary with No 96 and one 4.5m high on the left hand boundary with No 100.

7. Mr and Mrs Mackinnon moved to the property in 1975 and were the insured owners in January 2014 when they noticed internal cracking in the kitchen and external cracking at

the junction of the rear boiler room (in the extension) and main house. The damage worsened during the summer of 2014 and was reported to the claimant in December 2014.

8. The claimant instructed loss adjusters Crawford Specialist Property Services UK ("Crawford") to investigate and prepare a technical report. Crawford issued a report ("the Crawford Technical Report") to the claimant on 11 March 2015. It described, inter alia, 2mm internal cracks in the bathroom and kitchen, a 7mm diagonal tapering crack to the rear right hand side of the extension at first floor and a 6mm vertical tapering separation of the garage junction to the main house. The pattern and nature of the cracking was described as indicative of an episode of subsidence apparently caused by clay shrinkage. T1 was identified as a possible cause of root induced shrinkage. The subsidence ought therefore to have been reversible, by rehydration of clay soils in the winter months causing the cracks to close, provided the cause of the movement was dealt with. The report recommended further investigations, involving trial pit(s) to determine the depth and type of footings, boreholes to determine the nature of the subsoil and influence of any roots, and monitoring to establish the rate and pattern of movement. A specialist arboriculture report would also be necessary.

9. Crawford instructed CET Structures Ltd ("CET") to carry out ground investigations. CET visited the property on 1 June 2015 and in the course of their investigations dug a trial pit and sank two boreholes. The block plan below is extracted from their site investigation factual report and shows the relationship of the house, the extension and the garage, together with the location of the trial pit and borehole 1 (TPBH1) on the rear right corner of the extension. As notes on the plan show, the site slopes down from rear to front and from left to right looking from the road frontage. Borehole 2 (BH2) was sunk at the front of the house as a control. The findings of the site investigation ("the CET report") were supplied to Crawford, including an analysis of root samples dated 4 June 2015 and laboratory test results dated 10 June 2015.



10. On 19 June 2015 Crawford issued an addendum technical report ("the Crawford Addendum report") to the claimant setting out the findings of the CET investigations. It concluded with a recommendation that T1 should be removed, confirming that they were satisfied there would be no adverse risk of heave to the property in doing so. The CET survey of drains at the rear of the property had identified the need for repair to drains around the extension, but drainage was not believed to be a factor in causing the structural movement. The drains were subsequently repaired in September/October 2015.

11. Crawford next instructed MWA Arboriculture ("MWA") to provide a report for the purpose of assessing the potential role of vegetation in respect of subsidence damage. MWA carried out a site visit and reported to Crawford on 20 July 2015. The report concluded:

"Based on the technical reports currently available, engineering opinion and our own site assessment we conclude the damage is consistent with shrinkage of the clay subsoil related to moisture abstraction by vegetation. Having considered the available information, it is our opinion that on the balance of probabilities T1 will be the principal cause of any damage due to clay shrinkage subsidence. If an arboricultural solution is to be implemented to mitigate the current damage and allow the soils beneath the property to recover to a position such that an effective repair solution can be implemented we recommend that T1 is removed. We have given consideration to pruning as a means of mitigating the vegetative influence, however in this case, we do not consider pruning offers a viable long term solution."

12. On 28 July 2015 Crawford instructed Knight Associates to commence level monitoring. Monitors were installed at 12 points around the rear of the house, the extension and the garage. A total of 11 readings were taken from the date of installation through to 18 January 2018.

13. On 26 August 2015 MWA made the first application to the authority for removal of T1. It was accompanied by the four reports produced between March 2015 and July 2015, that is: the Crawford Technical Report, the CET report, the Crawford Addendum Report and the MWA report. These reports, which I will refer to as "the 2015 reports", were the basis of the claimant's case in each of their three applications to the authority for consent to fell T1. The application stated briefly the reason for applying to have the tree removed:

"The neighbouring property 98 Old Park Ridings is suffering movement/damage identified by engineers as being due to clay shrinkage subsidence and the above tree has been recommended for removal to restore stability. Due to the size and proximity of the tree to the property , pruning does not offer a viable alternative solution in this case. Oak roots have been recovered from below the foundations in a plastic clay soil of high plasticity/volume change potential which from the soil test results were found to be desiccated."

14. The evidence provided by Ms Davidson shows that the authority's Tree Officer, Mr Downing, was responsible for reporting and making a recommendation for each of the three applications. It is therefore helpful to review the full sequence of applications, with the reasons for refusal in each case, to understand the context for third refusal with which this case is concerned. Mr Dowding made a site inspection on 1 October 2015 and then wrote a concise analysis of the 2015 reports. In his report Mr Downing noted the lack of any level

monitoring or crack monitoring, which was a required submission where a tree was alleged to be the cause of subsidence building damage. Without it a progressive and cyclical pattern of building movement related to vegetative subsidence could not be demonstrated. He went on to say:

"Nevertheless, the submitted evidence does not show on the balance of probabilities that the tree in question is a significant material cause in subsidence damage to the property. Live tree roots have not been found and desiccation of soil is not shown in the upper soil horizons where live tree roots would be expected to be found. The soil is only shown to be desiccated at significant depth where it only appears ancient relic tree roots have been found. The tree is approximately 30m distant to the property damage. It is unlikely that the tree has rooted this far and more likely that prior to development of the residential buildings the whole area was forested and this is the explanation for any roots found."

15. In recommending refusal Mr Downing noted that no other reasonable alternative solutions had been presented by the applicant, although it appeared that a root barrier installed across the garden could be achievable to prevent tree root encroachment and any potential damage to the property. A refusal notice was issued on 15 October 2015.

16. Level monitoring over the next 12 months demonstrated continuing movement at the property. MWA made a second application for consent to fell T1 on 5 October 2016, supported by the 2015 reports together with the results of level monitoring between 28 July 2015 and 22 September 2016. This application contained extended reasons as set out below, with information underlined which has subsequently been agreed by the parties to be wrong and misleading:

"Investigations into the damage have been conducted and the following information/evidence obtained:
1. Engineering opinion is that damage is due to clay shrinkage subsidence.
2. Foundations extend to 900mm bearing on to clay.
3. Site investigations and soil test results have confirmed a plastic clay subsoil of high volume change potential (NHBC Classification) susceptible to undergoing volumetric change in relation to changes in soil moisture.
4. Suction values <u>indicate severe to very severe desiccation in BH1</u> (BRE Digest 412) located to the rear of the property and closest to the offending tree.
<u>5. Live oak roots have been recovered from below foundation depth in TP/BH1 & depth of 5600mm below ground level.</u>
6. <u>The observed desiccation is coincident with recorded root activity.</u>
7. Desiccation is at depths beyond ambient soil drying effects and entirely consistent with the soil drying effects of significant vegetation.
8. Level monitoring for the period 28.07.15 to 22.09.16 clearly shows a cyclical pattern of movement indicative of the effects of the offending tree on soil moisture and volumes to the rear of the property. The uplift phase of the building can only be attributable to an expanding clay soil from a desiccated sate due to the soil drying effects of the oak.
9. Drains can be discounted as a causal factor given the recorded desiccation and by reference to the level monitoring data.

Established evidential and legal tests pertinent to subsidence damage claims have been met and the evidence confirms there can be no other cause of the movement and associated damage at the rear of the property other than the indirect influence of the subject tree.
Removal offers the only predictable arboricultural solution in abating the influence of T1. Pruning does not constitute a viable long term alternative solution in restoring stability to the property.
In the event the tree is retained, underpinning is very likely to be required at significant cost."

17. Before issuing a notice of refusal on 6 December 2016 Mr Downing produced a lengthy report which included an acknowledgement that:

"Some (not all) evidence of damage to the rear of the extension and the garage appears to be conducive with seasonal movement of foundations. However, the level monitoring results do not appear to be clear, being that the initial summer (2015) monitored was extremely wet and although a downward trend of foundation movement is shown in the latter part of 2016, the monitoring is ceased and foundation recovery is not shown, I would suggest without a further period of level monitoring, there is uncertainty as to whether seasonal movement of foundations is adequately demonstrated although it may be likely that seasonal movement has occurred."

18. Expanding on his previous analysis, Mr Downing referred to the leaking drains noted in the CET report as a likely reason for the high moisture content of the soil sample taken from under foundations at BH1. He also commented that a quantitative assessment of heave should be undertaken to support the statement in the Crawford Addendum Report that there was no adverse heave risk to the property, which was contrary to a statement in the earlier Crawford Technical Report that a soil risk analysis had suggested a potential heave risk. His conclusion included the following paragraph:

"Without a quantitative soil heave assessment I am unable to determine this application adequately informed. A simple qualitative assessment, together with the data from the soil investigations appears to suggest that the buildings were built on a clay soil with a deep-seated moisture deficit without the appropriate precautions to prevent seasonal movement as a result of any vegetation. Removal of the tree is unlikely to be an effective means to stabilize the foundations and in fact is likely to be more damaging causing soil heave as the soil re-hydrates. The Local Authority cannot authorize the removal of the tree given that further damage is potentially likely to the property as a result of the trees removal."

19. A third application for consent to fell T1 ("the 2017 application") was made by MWA on 8 November 2017, enclosing the 2015 documents together with level monitoring results from 28 July 2015 through to 17 May 2017 (a further reading on 23 November 2017 was made available before the Tree Officer reported) and a heave calculation. The reasons provided in the application form were identical to those listed above from the 2016 application, with the addition of a further paragraph dealing with the risk of heave:

"The previous refusal notice (Ref: 16/04564/TPO) refers to a deep-seated persistent moisture deficit and removal of the tree may result in further damage to the property. There is no evidence of a deep-seated persistent moisture deficit provided by the council. A heave

calculation has been undertaken (attached) and engineering opinion is that the level of predicted heave is concluded to be acceptable. This allows the council to make an informed decision in relation to heave."

Again it was stated that: "In the event the tree is retained, underpinning is very likely to be required at significant cost and insurers reserve the right to recover these costs in the event consent for removal is refused."

20. The application was assessed by Mr Dowding, who noted that the level monitoring did not appear to show the seasonal summer shrinkage and winter recovery associated with root related moisture extraction. His report included comments made by the authority's structural engineer. In particular these challenged the interpretation of CET data which had concluded that the subsoil was desiccated and introduced the idea that a previous equilibrium had been compromised by the planting of new trees closer to the property within the garden. The conclusion was that the most probable cause of damage to the property was the softening of foundation stratum due to leaking drains. Consent was refused on 2 February 2018 ("the third refusal") for three reasons:

"1. The Council does not consider that the grounds specified by the applicant/agent (i.e. damage to property) sufficient reason to justify the proposed removal of a tree of significantly high amenity and bio-diversity value that makes a positive contribution to the amenity of the locality and wider environs.

2. The Council does not consider that it has been adequately demonstrated that the tree is a material cause in structural damage to the property in question.

3. No reasonable alternative solutions to the alleged structural damage have been adequately considered or instigated, such as the installation of a root barrier.

Informative: The tree is significantly older than the property and the applicant is hereby advised that the removal of this tree may lead to heave which can cause damage to property."

21. The claimant then instructed Crawford to provide an engineering solution to the problem. Crawford, in their Specification Request Document for the claimant dated 1 March 2018 stated: "Roots noted to a depth of 5.6m bgl in the site investigation so a piled solution will be required on this occasion." They sought arboricultural advice and reported to the claimant on 11 April 2018 that installation of a root barrier would not be possible due to the lack of access to the rear for an excavator, and because it would need to extend into neighbouring properties whose owners may not give consent. On 17 April 2018 the claimant notified the authority that it intended to seek reimbursement of the cost of underpinning necessitated by the third refusal.

22. Crawford sought tenders for remedial repair works to the property, to include the underpinning solution, and appointed Optera to carry them out. Works were carried out to the property between September 2018 and June 2019. During the course of piling works to the garage a land drain was encountered 1.2m below ground level which ran parallel with the back of the garage and was on the line of piles. This was excavated, removed and diverted around the piles with the existing clayware pipe replaced, but there is no evidence

that it was damaged or leaking. The footing in the garage was found to vary in depth with a 1.0m deep footing on the right-hand side and a 100mm footing on the left-hand side.

23. The total cost of works was £220,596.41, including professional fees and VAT. It was agreed that repairs to the property would have been required even if consent to fell had been given and therefore that only the costs of underpinning should be the subject of a claim. The expert engineers were directed to provide, after the hearing, a joint statement showing their respective positions on the apportionment of the total cost between repairs and underpinning, and between the garage and the extension. For the claimant Mr Allen apportioned £126,581.53 to underpinning, of which 67.5% was attributed to the garage and 32.5% to the extension, with £16,899.22 on top for professional fees giving a total of £143,480.75. For the authority Mr Freeman apportioned £88,453.91 to underpinning, of which 68% was attributed to the garage and 32% to the extension, with £10,759.08 on top for professional fees giving a total of £99,212.98.

24. The claimant sent a letter of claim to the authority on 3 August 2020, confirming a total outlay of £253,548.39 with quantum of claim to be clarified in due course. A response, denying liability, was made on behalf of the authority on 27 January 2021. The claimant made a reference to the Tribunal on 31 January 2024.

**Legal background**

25. On 22 July 1957 the authority made the Enfield Tree Preservation Order No 2 ("the TPO") pursuant to section 28 of the Town and Country Planning Act 1947. It was confirmed by the Minister on 20 May 1958 and protects, inter alia, trees within Bush Hill Park Golf Course, which adjoins the property.

26. Under section 193 of the Planning Act 2008, TPOs made prior to 6 April 2012 take effect with the omission of all their provisions except those which identify the trees to which the order applies. In their place the provisions of the Regulations apply.

27. Regulation 13 prohibits, inter alia, the felling of protected trees without the consent of the local planning authority, subject to certain exemptions in regulation 14. Regulation 16 prescribes the form and content of an application to carry out works to a protected tree. Regulation 17 provides that an authority to whom an application is made may grant consent, with or without conditions, or may refuse consent. There is a right of appeal to the Secretary of State against an authority's refusal of consent.

28. Regulation 24 provides for compensation. So far as material, it states:

> "(1) If, on a claim under this regulation, a person establishes that loss or damage has been caused or incurred in consequence of—
>
> (a) the refusal of any consent required under these Regulations;
>
> …
>
> that person shall, subject to paragraphs (3) and (4), be entitled to compensation from the authority.
>
> …

(4) In any case other than those mentioned in paragraphs (2) or (3), no compensation shall be payable to a person—

(a) for loss of development value or other diminution in the value of the land;

(b) for loss or damage which, having regard to the application and the documents and particulars accompanying it, was not reasonably foreseeable when consent was refused or was granted subject to conditions;

(c) for loss or damage reasonably foreseeable by that person and attributable to that person's failure to take reasonable steps to avert the loss or damage or to mitigate its extent; or

(d) for costs incurred in appealing to the Secretary of State against the refusal of any consent required under these Regulations or the grant of any such consent subject to conditions.

…

(6) Claims for payment of compensation by virtue of paragraph (1) shall be made in writing to and paid by the authority.

…

(8) Any question of disputed compensation under this regulation shall be referred to and determined by the Upper Tribunal.

(9) In relation to the determination of any such question, the provisions of section 4 of the Land Compensation Act 1961 (costs for proceedings of Upper Tribunal) and sections 22 (Tribunal Procedure Rules) and 29 (costs or expenses) of the Tribunals, Courts and Enforcement Act 2007 shall apply subject to any necessary modifications and to the provisions of these Regulations.

…"

29. Interest is payable on compensation awarded under regulation 24 pursuant to section 80 and Part 1 of Schedule 18 to the Planning and Compensation Act 1991 and section 32 of the Land Compensation Act 1961 at the rates specified by the Acquisition of Land (Rate of Interest after Entry) Regulations 1995.

**The issues to be determined**

30. Counsel for the parties had agreed the following statement of issues:

"The overarching issue is whether the claimant has established that part or all of the claimed cost of works to the property was incurred in consequence of the authority's third refusal. This breaks down into the following sub-issues:

(1) Was the oak tree T1

(a) (on the claimant's case) **an <u>effective and substantial cause</u>**, not the sole or predominant cause, (based on the test for a claim in nuisance)

or

(b) (on the authority's case) **the <u>natural and probable cause</u>** (based on the test in a statutory claim for compensation)

of subsidence damage to the property?

It was common ground that the evidential burden is on the balance of probabilities.

(2) Having regard to the third application for consent to fell and the documents and particulars accompanying it, was the loss to the claimant (the cost of underpinning) reasonably foreseeable by the authority when consent was refused?

(3) Was the loss reasonably foreseeable by the claimant and attributable to its failure to take reasonable steps to avert the loss or mitigate its extent?

(4) What is the quantum of loss attributable to the third refusal?"

31. Simply stated, the issues to be determined are causation, foreseeability (by the authority and the claimant) and the quantum of loss. During the two days of the hearing a great deal of technical evidence and expert opinion was adduced on the issue of causation, on which each of the four experts had been asked to give their opinion. This is at the heart of the case, and the basic question to be answered is: on the balance of probabilities was T1 a cause of subsidence to the property? (Whether the cause must have been "effective and substantial" or "natural and probable" was a detail on which the parties disagreed.) This would demonstrate that its removal, in the absence of an alternative feasible preventative measure, would have enabled the claimant to avoid the cost of the underpinning to prevent further damage. The relevant date at which that determination must be made is the date of the third refusal, 2 February 2018, and the determination must be made on the basis of evidence available to the authority at that date. The burden of proof is on the claimant.

**Technical evidence of causation**

32. The key technical factors which need to be considered in determining a causal relationship between T1 and the subsidence damage are: the extent to which the subsoil was desiccated, which would indicate removal of moisture through the roots of vegetation, leading to subsidence; whether identified movement to the structures showed a seasonal and cyclical pattern, which would indicate cyclic root-induced shrinkage and recovery; whether the evidence of oak tree roots in BH1 was sufficient to indicate that T1, at a distance of 29.15m from the garage and 31.65m from the extension, would extract sufficient amounts of moisture to cause subsidence.

33. Determination of the causal relationship in this case was also influenced by other factors, which included: the discovery in June 2015 of leaking drainage in the vicinity of TPBH1, which the experts agreed led to high moisture content readings at depths of 0.9m and 1.5m; the close proximity to T1 of a second oak tree, T2, and the possibility that roots in BH1 were from that tree; the discovery of a land drain behind the garage when piling works were carried out in late 2018 – early 2019; the discovery at the same time that the footing to the left side of the garage was only 100mm deep. Obviously the last two factors were not known to the authority at the date of the third refusal.

*34.* In order to reduce, as much as possible, reiteration of the core material I will first review the evidence available to the authority, including commentary on elements agreed and not agreed by the parties and their experts. I will then review the submissions made by the respective counsel on how that evidence should be interpreted in the light of the expert evidence and cross-examination.

*The Crawford Technical Report*

35. This initial report to the claimant was not relied on by either party and will therefore not be considered further.

*The CET Report*

36. The CET report comprised 12 pages of technical data, without index or narrative. It formed the basis of subsequent reports submitted with the applications and it has formed the basis of analysis by all the experts in this case. The data included:

- a profile description to 1.1m below ground level ("bgl") for TP
- a profile description to 6.0m bgl for BH1 and BH2
- laboratory analysis of the soil samples taken from BH1 and BH2, showing moisture content, liquid limit, plastic limit, plasticity index, liquidity index, modified plasticity index, soil sample suction and shear vane strength to 6.0m bgl
- graphs to show soil moisture content (%) against in situ shear strength (kPa) to 6.0m for BH1 and BH2
- graphs to show soil moisture content (%) against soil suction (kPa) to 6.0m for BH1 and BH2
- laboratory analysis of root samples taken from TP (underneath the foundations) and from BH1 between 1.1m and 2.0m;
- a drainage layout plan showing repair work required around the extension

37. The expert engineers agreed that the findings of the CET report showed the extension foundations were supported on soft clay at 900 mm below ground level. Above the 500mm thick foundation was a 150mm layer of made ground, a 70mm concrete slab supporting 50mm stone, 200mm sand and 50mm block pavers. Beyond the edge of the foundation the made ground was 700mm thick (550mm + 150mm). The description of the soil below foundation level in BH1 was typical of London Clay. Laminations of orange silt and fine sand were noted between depths of 1.1m and 1.9m; pockets of orange silt and fine sand were noted below 4.0m. Water seepage was noted in BH1 at 4.0m depth.

38. The subsoil tests confirmed the clay subsoil below 900mm had a plasticity index (PI) varying from 44% to 52%. Mr Freeman considered that the subsoil was devoid of desiccation. Mr Allen considered that the results indicated possible desiccation between 2m and 2.5m depth, but not severe desiccation from 1.5m to 6m as had been stated by Crawford (see below).

39. The arboriculture experts agreed that the two root samples taken from TP (underneath the foundations) and the two root samples taken from BH1 between 1.1m and 2.0m were identified as oak and therefore from an oak on Golf Club land, most likely T1 but possibly T2 also. All samples were less than 1mm in diameter and none contained starch, although that would not necessarily be present in live juvenile roots in early summer. The presence of identifiable roots confirmed that they had been active. Mr Pryce described T1 and T2, just 6m apart, as a co-dominant pair with individual crowns hard to distinguish, and likely to have a combined root system. The dead and decomposing root fragments to 5.6m depth were not identified.

*The Crawford Addendum Report*

40. This report to the claimant provided narrative interpretation of the CET findings, as set out below. The underlined words are agreed to be an error.

41. "DISCUSSION

The results of the site investigations confirm that the cause of subsidence is root-induced clay shrinkage. The clay is plastic and thus will shrink and swell with changes in moisture content. Roots have extracted moisture content below the depth of the footings, thus causing differential foundation movement to occur. This is supported by the following investigation results:

- The foundations are at a depth of 900mm which is below the level that normal seasonal movement would occur.
- The moisture content profile indicates a reduction in moisture content between a depth of 0.9m and 2.5m which is indicative of desiccation at this level. This is also coincident with the depth of root activity.
- Atterberg limit testing indicates that the soil has a very high plasticity and hence will shrink and swell with changes in moisture content.
- Suction tests indicate severe to very severe desiccation between a depth of 1.5m and 6.0m coincident with the depth of root activity.
- Roots were found to a depth of 2.0m and were identified as either Quercus or Castanea. Quercus are oaks and Castanea include sweet chestnut. In this instance, we consider that the roots will emanate from the large oak beyond the rear boundary. The roots recovered were juvenile and therefore starch was not present.

RECOMMENDATION

The cause of movement needs to be dealt with first. From the results of the site investigation, we are satisfied that the Oak tree within the golf club land can be removed. Based on our analysis, we are satisfied there is no adverse heave risk to the property. Our Mitigation Unit will liaise with the third party in this respect.

Following completion of the tree management works, we will undertake a suitable period of monitoring to confirm stability has been achieved before undertaking repairs to the property."

*The MWA Report*

42. The conclusion of the MWA report has been provided earlier, but it is important to note that the report relied on the technical data from the CET report and the Crawford Addendum Report, in which there was an error. In one important respect, as underlined below, it is agreed that the MWA report misrepresented the technical data on the depth at which roots (by implication those that had been identified) had been found, by stating:

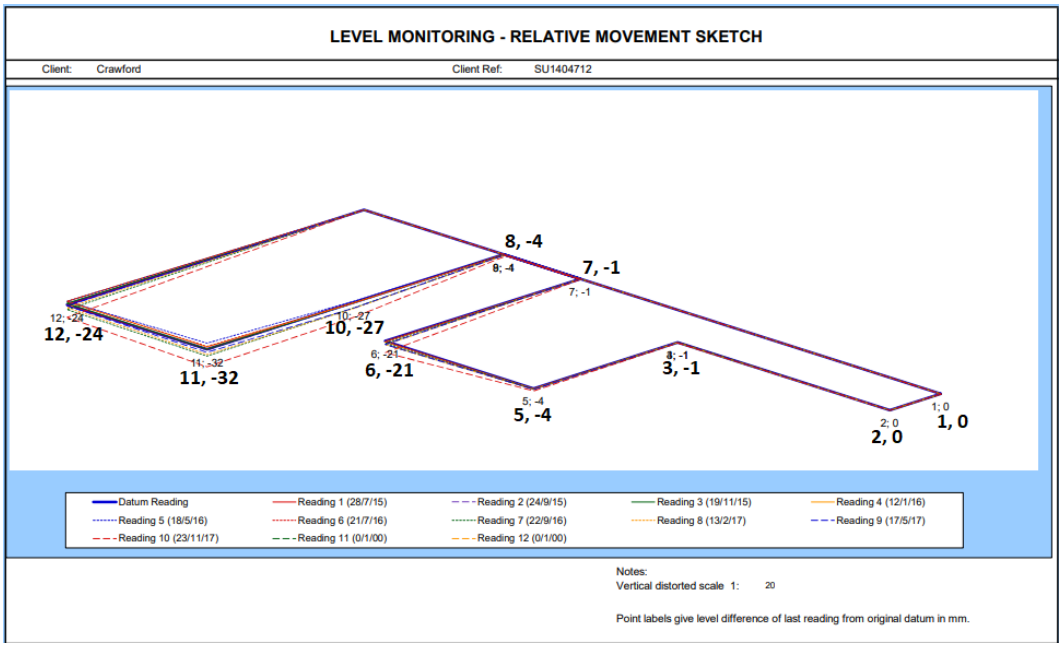
"Roots were observed to a depth of 5600mm bgl in borehole 1 and recovered samples have been positively identified (using anatomical analysis) as either Quercus (Oak) or Castanea (Sweet chestnut), the origin of which will be T1 confirming the influence of this vegetation on the soils below the foundations. The root samples recovered were found to be very juvenile which would explain why no starch was present."

*The heave calculation*

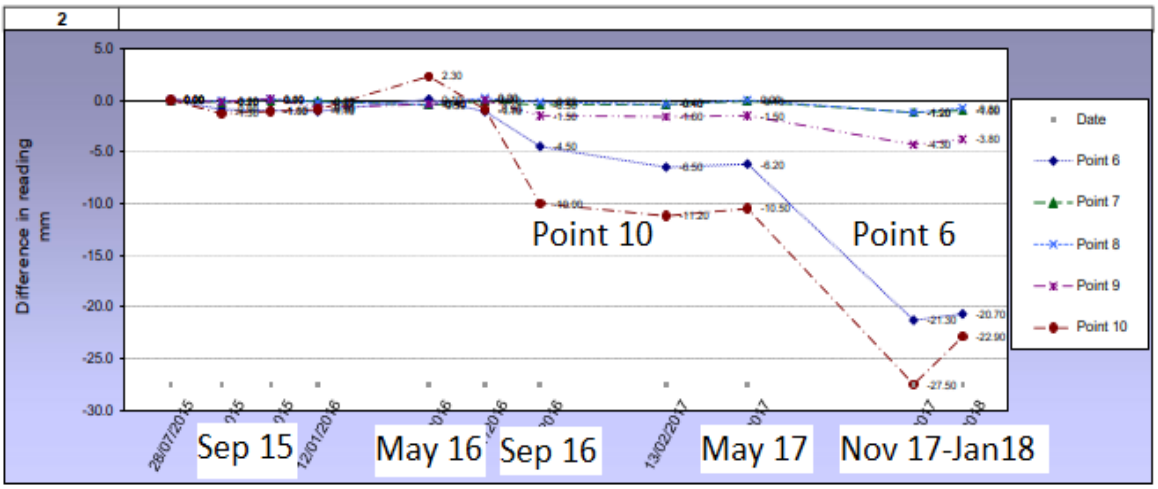
43. The heave calculation, made as at 1 June 2015 using data from the CET report, indicated a heave risk of 6.5mm. This is considered to be very low. However, it was Mr Allen's opinion that the subsequent downward movement of 34mm recorded to the garage by November 2017 would indicate a "real risk of heave" by the time the decision to underpin was taken.

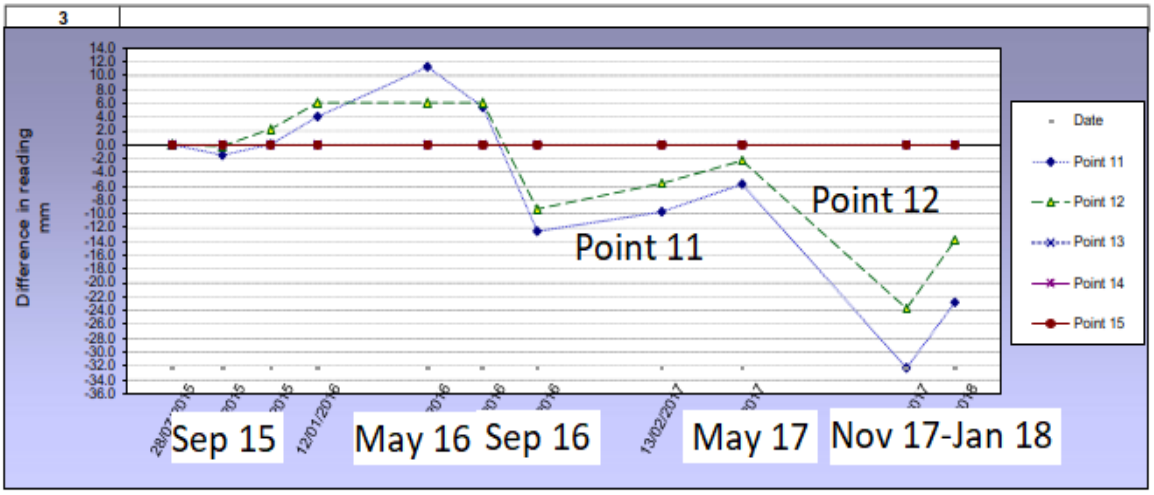
*The level monitoring from 28 July 2015 to 18 January 2018*

44. The positions of level monitors and the maximum reading at each are summarised in the relative movement sketch below. The first number is the point number and the second number is the greatest level difference in mm recorded at that point over the period. Two points are missing: point 4, which is close to point 3 and showed very similar readings, and point 9, which is close to point 8 and showed very similar readings. Visually it is apparent that the greatest movement was to the rear of the garage at points 10 (-27mm), 11 (-32mm) and 12 (-24 mm). The only significant movement on the extension is shown at point 6 (-21mm). It will be noted that point 6 is the corner of the extension where the TPBH1 investigations were made.




45. The level monitoring results over the period for points 6 – 10 and 11 - 12 are shown in the charts below, with labels added as an aid. It should be noted that the y axis scale is different on each chart to accommodate the relevant range of movement. These charts were analysed by the experts to look for evidence of seasonal and cyclical movement, which would be indicative of tree root desiccation of shrinkable clay, so particular note was taken of any recovery over the winters 2015-16, 2016-17 and 2017-18.






46. The engineering experts agreed that the monitoring at points 10, 11 and 12 around the garage displayed a seasonal pattern of movement indicative of tree root desiccation of a shrinkable clay subsoil below the foundations, but Mr Freeman considered that this could have been caused by any of the trees at the rear of the property, including the cypress tree and privet hedge growing close to the garage. There was obvious progressive downward movement recorded at points 6, 10, 11 and 12 and Mr Freeman considered that the soil at the rear had been affected by sub-surface erosion. The moisture contents recorded in BH1 at depths of 0.9m and 1.5m were unnaturally high and indicative of a soil that had undergone swelling and softening, which can only occur where a void is created by excavation or erosion. The presence of the soft layer was confirmed by the suction tests and the exceptionally low shear vane reading of 39kPa at 0.9m. In his view the only plausible explanation for the progressive downward movement was sub-surface erosion caused by water escaping from the leaking drainage and running down the slope under the foundations to the extension and the garage. Softened soil was a symptom and it was compression of the voids that would cause downward movement to the supported foundations. Drainage repair in autumn 2015 may have encouraged erosion by lowering the water table, allowing a higher flow of water through the soil in the summer. No investigation was made in June 2015 of the downpipe and drains at the rear of the garage to rule out leakage there too.

47. In Mr Allen's opinion, whilst the high moisture content was likely to be the result of nearby drain failure, the subsoil still had adequate strength to resist the loads applied by the foundations. 39kPa equated to a safe bearing pressure of 65 kN/sqm, which exceeded the estimated load applied by the foundation of 40kN/sqm. London clay soil would swell if it had been previously desiccated and there was no evidence of void formation below foundation level in the BH1. The sub-surface erosion mechanism described by Mr Freeman would have been present since the property was constructed and not commenced in 2014. In his opinion the reduced amount of upward movement, compared with subsidence, resulted from a persistent moisture deficit in the clay subsoil where winter rehydration was less than the desiccation of the previous summer. Once the drains were repaired in 2015 the roots were likely to have been desiccating to a greater depth than recorded in the 2015 site investigation.

48. The arboriculture experts also considered the level monitoring results. In Dr Dobson's opinion the high moisture content of the soil around TPBH1, in June 2015 when the drains were found to be leaking, probably caused oak roots to proliferate and then continue to

extract water after the drains were repaired in September 2015, causing progressive desiccation and downward movement superimposed on the general pattern of subsidence and recovery. He considered that the limited upward recovery in the winter of 2016-17 may have been because of drier than average conditions in October and December 2016, and again in early 2017, limiting soil rehydration.

49. It was Mr Pryce's opinion that development of a persistent moisture deficit would require a high density of active live roots, which would tend to occur close to the trees rather than at the periphery of the root system. T1 and T2 were mature trees so their rooting zones would be unlikely to have altered appreciably in recent years to have caused the downward movement. Mr Pryce agreed that roots would proliferate where conditions were favourable, but considered those found in TPBH1 were outliers that would have become redundant once the leaking drains were repaired. The trees (T1 and T2) had good rooting conditions in every other direction so would have stopped supplying these roots with their energy supply of starch, in favour of roots closer to them with easier sources of water.

50. Dr Dobson referred to reported research in which monitoring of ground level on shrinkable clay near to an oak tree had been carried out since 2006 by Mr Freeman's company on behalf of the Clay Research Group. Subsidence movements were found to be greatest at a distance of 1.2 times the height of the tree and Mr Freeman had commented that the zone of influence of a larger tree could extend beyond 1.2 tree heights away. In this case where T1 was 28m tall, the zone of influence could therefore extend beyond 33.6m, which was further than the distance to the garage and the extension. Dr Dobson reiterated that oak roots were present under the foundations of the extension, and although only a few were found in the borehole, it was only 70mm in diameter and they must have been plentiful.

51. Mr Pryce considered that measures of tree height to influencing distance were convenient in providing a guide for risk management exercises but were not reliable as an indicator of root spread in individual trees. From published research, the maximum distance at which oak tree roots had caused damage was 30m, and then for only a small fraction of the tree population. He acknowledged, fairly, that the presence of roots meant there was a possibility that the oak tree roots had spread sufficiently to be the cause of damage but, in his long experience as a tree inspector, this seemed unlikely.

**Submissions for the claimant on causation**

52. It was essentially the claimant's case that the presence of a clay subsoil with high volume change potential, the presence of oak tree roots beneath foundation level, a record of seasonal and cyclical structural movement, and the presence of a high water demand tree (T1) at a distance of 1.1 times its height, were clear evidence that T1 was an effective and substantial cause of damage to the property.

53. Mr Green made comprehensive submissions on the authorities which had considered the appropriate tests for causation.

**Submissions for the authority on causation**

54. Mr Neill submitted that the claimant could not establish on the balance of probabilities that the movement to either the extension or the garage occurred as a result of the roots from T1. It was important to note that two different structures were in issue, with different sets of foundations at different depths. The claimant's case essentially turned on the identification of two sets of juvenile oak tree roots, present in a borehole, at a depth of less than 2.0m. The claimant was asking the Tribunal to draw inferences from the pattern of measured movements at the property that it was attributable not just to root-based subsidence but to T1.

55. It was the authority's case, based on the views of Mr Freeman, that movement of the extension was caused not by root-induced tree subsidence but by drainage failure. Unnaturally high moisture content was found in BH1 at depths of 0.9m and 1.5m, for which the only plausible explanation was water escaping from drainage. Drainage failure is likely to have caused sub-surface erosion and therefore the settlement identified within the extension. Whilst the damaged drain discovered in 2015 was repaired, there were other drains subsequently identified on the property (during the underpinning works) that could also have contributed to water escape.

56. Whether the results of the investigations made in June 2015 were consistent with root-induced subsidence relates to the question of desiccation, which is a sign of root-induced subsidence. It was now agreed that there was no desiccation in the subsoil.

57. Whilst it was common ground that there was some downward movement to the extension, it was the authority's case that this was progressive, not cyclic and not indicative of root-induced shrinkage. It was common ground that the movement to the garage displayed a seasonal pattern indicative of tree root desiccation, but no borehole was dug behind the garage to ascertain the extent and depth of any roots, and whether they were attributable to T1, so the burden of proof could not be met.

58. T1 was growing at a considerable distance from both the garage and the extension and it was Mr Pryce's view that the roots observed were beyond the maximum published tree to damage distances. Such roots as were found in BH1 were unlikely to be capable of extracting sufficient amounts of moisture to cause significant subsidence. And there was no evidence whether the root samples belonged to T1 or its neighbour T2.

59. The claimant's case was not that T1 caused any shrinkage in 2014 which gave rise to the damage to the property, but that from 2015 to 2017 the net downward movement was caused by T1's root system continuing to extract water even after 2015 when the drain was repaired. The authority submitted that it was unlikely a mature oak tree would behave in this way and the roots found were more likely to be 'outliers' attributable to the broken drain.

60. The authority's case was that T1 was neither the 'natural and probable' cause of the subsidence that occurred, nor did it pose a real risk that subsidence might occur in the future. But even if it had had some influence on the degree of movement identified to the two structures the claimant had not established on the balance of probabilities that it was the 'effective and substantial' cause.

**Discussion of causation**

61. A notable feature of the expert evidence adduced by the parties is that both the engineering experts and the arboriculture experts have had to speculate on causation beyond what can be determined from the facts available. This is not to criticise them, because each was very experienced in their field and able to use the benefit of that experience in analysing the somewhat limited technical evidence. Their reports have been an invaluable aid to interpreting that evidence but, in making my determination on causation, on the evidence available to the authority when they made their third refusal on 2 February 2018, I must exercise caution in choosing whether to rely on any element of speculation.

62. The first and key factor to be considered in determining a causal relationship between T1 and the damage at the property is the evidence on desiccation in the subsoil, which would indicate removal of moisture through the roots of vegetation, leading to subsidence. Much has been said about desiccation in all the expert reports but, in the end, the engineering experts agreed that there was no evidence of severe or very severe desiccation in the subsoil at TPBH1 when tested in June 2015. There was speculation as to what might have happened in the subsoil in the period of over two years after the drains were repaired, during which movement of the structures was recorded, but no further site investigations were carried out to establish whether desiccation had occurred. The absence of evidence of desiccation is a significant weakness in the claimant's case for causation in respect of damage to the extension, for which the evidence from TPBH1 is relevant. As the authority has pointed out, there was no site investigation at all behind the garage to establish whether there was desiccation of the subsoil either initially or subsequently which might have suggested a causal relationship with T1.

63. The second factor to be considered is evidence of a seasonal and cyclical pattern of movement to the structures, which would indicate root-induced shrinkage and recovery. The engineering experts agreed that the movement at points 10, 11 and 12 around the garage did display a seasonal pattern of movement, but they were not agreed on the mechanism causing the underlying progressive downward movement. Mr Freeman's theory was that this was a result of sub-surface erosion caused by water running down the slope under the foundations as a result of drainage failure. Mr Allen's response was that such a mechanism would not have commenced in 2014 as a result of drainage failure and, in any event, the drains were repaired in September 2015. However, Mr Allen's only alternative explanation for the continuing downward movement, which he called a reduced amount of upward movement, was the development of a persistent moisture deficit in the clay subsoil. Dr Dobson had postulated that the roots of T1 proliferated while the drains were leaking and then continued to extract water after repair, causing progressive downward movement and desiccation. Again, without any subsequent site investigation evidence this remains speculation. Dr Dobson also commented that limited upward recovery may have been attributable to drier than average weather conditions over winter 2016-17. Mr Pryce did not disagree that roots would have proliferated as a result of the leakage, but he considered that they would have become redundant after the drain repair and since T1 and T2 were mature trees their rooting zones were unlikely to have altered appreciably in recent years.

64. I conclude that whilst there is obvious evidence of seasonal shrinkage and some recovery around the rear of the garage, there is only speculation as to what might have happened in the subsoil to cause the progressive downward movement during the period of monitoring.

Without any factual evidence the causation argument for movement of the garage is weak. For the extension, the only significant evidence of seasonal shrinkage was at point 6, and there was barely any evidence of winter recovery afterwards. Again, Mr Freeman relied on his sub-surface erosion theory to explain the progressive downward movement and Mr Allen relied on the theory of root proliferation to explain it. Whilst neither theory on the cause of downward movement can be relied on, the evidence is clear that there was no pattern of seasonal shrinkage and recovery to the extension. This is another significant weakness in the claimant's case for causation of damage to the extension.

65. Finally, I must consider whether there was evidence in the documents submitted with the 2017 application to indicate that T1 and its roots would extract sufficient moisture to cause subsidence. The evidence of identified oak tree roots in BH1 was indisputable, but the arboriculture experts were not agreed that this was sufficient evidence. Only four roots were found, all of which were juvenile. T1 was at a distance of 29.15m from the garage and 31.65m from the extension. Dr Dobson considered that research confirmed these distances were within the potential zone of influence of an oak tree, and that it was likely that roots were plentiful in areas outside the borehole. Mr Pryce did not dispute the research, or the possibility that the oak roots could spread sufficiently to be the cause of damage, but he remained firmly of the opinion, based on his long and extensive experience that it was unlikely at these distances. He was also firmly of the opinion that the roots identified could have been either from T1 or T2, which were so close as to be likely to have a combined root system. Dr Dobson did not dispute this possibility and in their joint statement the arboriculture experts expressed the situation as: "The oak roots were from an oak on golf course land, most likely T1, but possibly T2 also.".

66. My conclusion from the evidence and the expert opinions is that it has not been demonstrated that T1 and its roots extracted sufficient amounts of moisture to cause subsidence to the garage and the extension. The distance from the tree to the structures is at the margin of the maximum distance where damage has been recorded in research. The roots identified in June 2015 were few and juvenile and only found to a depth of 2.0m. It is speculation that roots were plentiful outside the borehole. It also requires speculation to infer that roots which had proliferated during the period when drains were leaking continued to extract water after the repair sufficient to cause progressive downward movement of the structures. Without evidence of further site investigation during the monitoring period this speculation is not persuasive. The fact that the identified roots might even have belonged to T2 is a complicating factor in causation, but I consider that the evidence was insufficient without that factor.

67. I conclude that the evidence on desiccation, on seasonal movement and on the presence of oak roots in TPBH1 does not establish on the balance of probabilities a causal link between T1 and subsidence damage to the property at the date of third refusal.

68. Having decided the factual issue of causation against the claimant the remaining issues do not arise.

69. For these reasons I dismiss the claim.

Mrs Diane Martin TD, MRICS FAAV

14 February 2025

**Right of appeal**

Any party has a right of appeal to the Court of Appeal on any point of law arising from this decision. The right of appeal may be exercised only with permission. An application for permission to appeal to the Court of Appeal must be sent or delivered to the Tribunal so that it is received within 1 month after the date on which this decision is sent to the parties (unless an application for costs is made within 14 days of the decision being sent to the parties, in which case an application for permission to appeal must be made within 1 month of the date on which the Tribunal's decision on costs is sent to the parties). An application for permission to appeal must identify the decision of the Tribunal to which it relates, identify the alleged error or errors of law in the decision, and state the result the party making the application is seeking. If the Tribunal refuses permission to appeal a further application may then be made to the Court of Appeal for permission.